means for generating an error vector from the reference vector and received samples of the signal;

means for determining noise variance of the incoming signal; and

an estimator for generating a Doppler correction factor having a real part representing amplitude correction and an imaginary part representing amplitude correction and an imaginary part representing phase correction, the estimator utilizing the noise variance, the error vector, the samples of the received signal and the sampling times.

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13. A system according to claim 12, wherein the Doppler correction factor β is generated according to the following equation:

$$\beta = E(\beta) + p^H (z - y - E(z - y)) / (\delta^2 / C_\beta + p^H p)$$

wherein E(β) is an expected value of β,

p^H is a complex conjugate transpose matrix of p, where p is the vector $(y_i, t_i)^T$,

z-y is the error vector,

E(z-y) is the expected error in the received samples,

δ^2 is the noise variance, and

C_β is a constant.

14. A system according to claim 2, wherein E(β) and δ^2/C_β are set to zero.

15. A system according to claim 12 which comprises means for applying a Doppler correction to the received signal samples using the Doppler correction factor β.

16. A system according to claim 12 wherein the signal comprises a transmission burst in a time slot in a TDMA mobile communication system, and wherein a new Doppler correction factor β is generated for each time slot.

17. A system according to claim 16 which comprises means for estimating E(β) as an average of generated values for β from previous time slots.

18. A system according to claim 16 wherein the real part of E(β) is set to be zero.

a| 19. A system according to claim 1 which comprises means for derotating the received signal samples by $e^{-j+imag(E(\beta))t}$, where E(β) is an expected value for β the derotated received signal samples then being used to generate the Doppler correction factor β in the present time slot according to the following equation:

$$\beta = E(\beta) + p^H (z - y)/(\delta^2 / C_\beta + p^H p).$$

20. A method for compensating said Doppler shift in a signal transmitted between a mobile station and a base station in a mobile communication system, the method comprising:

determining a channel impulse response for the channel on which the signal is received;

generating a reference vector from a set of known symbols in the channel impulse response;

generating an error vector from the reference vector and received samples of the signals;

determining noise variance of the incoming signals;

estimating a Doppler correction factor having a real part representing amplitude correction and an imaginary part representing phase correction, the estimating step using the noise variance, the error vector, the samples of the received signals and the sampling times; and

applying the Doppler correction factor to the received signal samples thereby to compensate for Doppler shift.

a1

21. A method according to claim 20, wherein the signal comprises a sequence of transmission bursts in a TDMA mobile communication system, and the Doppler correction factor is generated for each transmission burst.

22. A method according to claim 21, wherein the Doppler correction factor β is generated according to the following equation:

$$\beta = E(\beta) + p^H (z - y - E(z - y)) / (\delta^2 / C_\beta + p^H p)$$

wherein $E(\beta)$ is an expected value of β,

p^H is a complex conjugate transpose matrix of p, where p is the vector $(y_i, t_i)^T$,

z-y is the error vector,

E(z-y) is the expected error in the received samples,

δ^2 is the noise variance, and

C_β is a constant.